Remarks

Support for the amended claims

5   Amendments have been made to independent claims 1, 22, 36, and 44 to differentiate them from the disclosures of Day and Depledge. Dependent claims 2-11 and 14 have been amended to bring them into conformity with amended claim 1; claim 28 has been canceled and claims 24, 29, 31, 33, and 34 have been amended to bring them into conformity with amended claim 22; claim 37 has been canceled and claims 38 and 39 have been amended to bring them into

10   conformity with amended claim 36; claims 45 and 46 have been amended to bring them into conformity with amended claim 44.

The general effect of the amendments is to make it clear that in database systems that employ the bitmap values of the invention, users may directly specify operations on the bitmap values.

15   This characteristic of Applicant's bitmap values is pointed out in great detail beginning at page 14, line 28 of Applicant's specification as filed. Examples of direct specification of operations on bitmap values representing row IDs may be found beginning on page 21 and examples of direct specification of operations on bitmap values representing ePC product codes may be found beginning on page 28. The claims as amended are thus fully supported by the

20   Specification as filed.

Patentability of the amended claims over the references

The references all disclose various indexes that use bitmaps and operations that the database system performs on the bitmaps in the course of building, maintaining, and using the indexes.

25   As set forth in Applicant's *Description of related art*, beginning at page 1, indexes generally and bitmap indexes in particular are well known in the database system arts; further some database management systems provide facilities which permit users to define their own indexing systems. The limitations of these prior-art bitmap indexing systems are set forth beginning at page 5, line 15. Finally, as set forth at page 6, lines 38 to 34, it is an object of the invention disclosed in

30   Applicant's application to provide a database management system

in which *programmers had access to bitmap values* specifying subsets of large sets of values *and to primitive operations for the bitmap values*[. Such a database system] would greatly increase the number of situations in which bitmap indexes could be employed, would permit their use with objects having user-defined

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classes, and would permit the use of bitmap values generally to represent subsets of large sets of objects. (emphasis added)

The foregoing was reflected in Applicants' claim 1 by the use of the terminology "user-
5   accessible operations on the bitmap values".

In her rejection of claim 1, Examiner refers Applicants to paragraph [0022] of Day, which, however, discloses how the database engine uses and updates bitmaps as a side effect of executing queries. See also paragraph [010] in this regard. Depledge describes an automatic
10   technique for updating bitmap indexes as a side effect of changes in the table rows indexed by the bitmap values. See Depledge, col. 2, lines 25-55. To completely prevent such side effects from being considered to read onto Applicants' claims, Applicants have amended claim 1 to read as follows:

1. A database management system having the improvement comprising:
15   bitmap values, a bitmap value having a representation of a bitstring wherein set bits specify a set of objects whose definitions are built into the database management system, and
            bitmap operations provided by the database system, a bitmap operation having user-specified operands which are bitmap values and/or sets of objects
20   which permit users of the database system to directly specify operations on the bitmap values.

As amended, the claim's "bitmap operations" are "bitmap operations provided by the database system, a bitmap operation having user-specified operands which are bitmap values and/or sets
25   of objects". Amendments to the same purpose have been made to independent claims 22, 36, and 44.

As pointed out above, neither Day nor Depledge provides operations to the user which have "user-specified operands which are bitmap values and/or sets of objects", and consequently,
30   claim 1 as amended is not obvious over Day and Depledge.

In amended independent claims 22, 36, 44, and 57, the claims have all been amended to make it clear that the database management system in which the bitmap value is employed provides an operation to users for directly specifying how a string of bits is to be mapped to a second subset
35   of objects and   another operation to users for directly specifying setting bits of the string of bits that correspond to the first subset. The first of these operations is disclosed in the CREATE

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TABLE DDL at pages 21 and 31; the second is disclosed generally in the discussion of the set to bitmap operation at page 15, lines 1 and 2 and more specifically in the discussion of the ROWIDS2BMAP function at page 21, lines 2-23 and the EPCS2EPC_BITMAP function at page 9, line 22. Examples of the use of the operations may be found at page 23, beginning at line 17, and page 32, lines 28-32. Since neither Day nor Depledge disclose database systems that provide the operations set forth in amended claims 22, 36, and 44 to users of the database system, amended independent claims 22, 36, and 44 are also not obvious over the combination of Day and Depledge.

Dependent claims 13 and 31

These claims as amended are addressed to the fact that Applicant's bitmap values may be used in "user-specified fields of tables of the database management system" (claim 13). As already pointed out, in the prior art including that of the references, database systems have various kinds of indexes that use bitmap values, but the bitmap values in the indexes are not accessible to the user and the user cannot define a column in a table which contains the bitmap values of the indexes. As pointed out in claims 13 and 31, in database systems using Applicants' bitmap values, a user may define a column in a table which contains these values. For an example, see the CREATE TABLE DDL of page 21.

Conclusion

Applicants have amended their claims to overcome Examiner's rejections and have demonstrated that the claims as amended are fully supported by the Specification as filed and are patentable over the references. Applicants have thus been completely responsive to Examiner's Office action of 3/8/2007 and have thereby satisfied the requirements of 37 C.F.R. 1.111(b). Applicants consequently respectfully request that Examiner continue with her examination, as provided by 37 C.F.R. 1.111(a). No fees are believed to be required for this amendment. Should any be, please charge them to Deposit Account # 501315.

Respectfully submitted,

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